1.0 INTRODUCTION

PRC Environmental Management, Inc. (PRC) prepared this report for the U.S. Environmental Protection Agency (EPA) under contract number 68-W9-0009, Technical Enforcement Support (TES) 12, work assignment number C08055. This report documents PRC's findings during a review of the soil vapor survey (SVS) work plan for the 903 Pad, Mound, and East Trenches area and pilot test plan for soil vapor extraction (SVE) at the East Trenches area of operable unit (OU) 2, at the Rocky Flats Plant.

PRC completed a technical review of both the SVS work plan and SVE pilot test plan. Pursuant to EPA's request, PRC focused its review on whether the documents provide sufficient detail to guide the planned field work. Additionally, PRC compared these documents to the previously submitted interim measures and interim remedial action plan (IM/IRAP) for OU2. Both general and specific comments were generated during PRC's technical review. General comments pertain to the documents as a whole, whereas specific comments correspond to specific sections of each plan. The specific comments are referenced by page, section, paragraph, and table or figure number.

2.0 GENERAL COMMENTS

The following general comments pertain to overall problems noted in both the SVS work plan and pilot test plan.

2.1 SOIL VAPOR SURVEY WORK PLAN

1. This work plan states that the phase II remedial investigation (RI) data indicate that Individual Hazardous Substance Site (IHSS) 110 (Trench T-3) is better suited for the SVE pilot test in the east trenches than IHSS 111.1 (Trench T-4). However, none of the phase II data are provided to support this conclusion, nor is a rationale presented to justify this position. It should also be noted that IHSS 110 does not meet one of the three test site selection criteria. Figure 2-2 of the IM/IRAP clearly shows drums within the boundaries of this IHSS. The reason why this previously insuitable IHSS has now been chosen should also be explained.

Lastly, it should be noted that the pilot test plan contains a design for the SVE at IHSS 111.1 not IHSS 110. In fact, the pilot test plan does not even mention that IHSS 110 is the preferred location. To resolve this discrepancy, it is recommended that the Department of Energy (DOE) reference all the phase II RI data applicable to the east trenches, analyze them and then present the same choice for the pilot test in both the work plan and pilot test plan documents.

2. The IM/IRAP indicates that the phase II RI data will be used to pinpoint locations for the SVE. If there is not enough information, an SVS will be conducted to gather the additional data. However, the SVS work plan describes conducting these surveys at all three proposed SVE sites within OU2 and no reference is made to the phase II RI data. Therefore, it appears that the phase II data are not being used. DOE should explain why it is conducting an SVS at all three OU2 locations rather than relying on the phase II data and possibly an SVS to delineate appropriate locations for the SVE.

3. No schedules for implementation of or data evaluation of the SVS program are provided. However, page 2-1 of the pilot test plan states that the SVS will be conducted during the first half of 1993. If the schedule for implementation is known it should be provided in the work plan. In addition, the schedule for the SVS should be compared with the schedule for the SVE pilot test plan. This is important because the exact locations for the pilot test activities are partially dependent on the results of the SVS. Specifically, it is not clear how the final pilot test plan and bids for subcontractors can be ready as planned on January 12, 1993, when the SVS may not have been conducted by then. Lastly, the lack of a schedule severely limits EPA's ability to oversee the field activities. These apparent scheduling problems must be addressed in both the work plan and pilot test plan.

4. There is no discussion of problems associated with collecting SVS samples during cold weather. This is a concern because cold weather can impede the vapor flow. If the SVS will be conducted during the winter months, this issue must be addressed.

2.2 PILOT TEST PLAN

1. The pilot test plan has been prepared for IHSS 111.1 (Trench T-4). The SVS work plan specifies that IHSS 110 (Trench T-3) will be used to test the SVE unit in the East Trenches Area. IHSS 110 has been designated in the pilot test plan as an alternate test site. Since most of the information contained in this test plan pertains to IHSS 111.1, a substantial revision may be required to include site-specific data for designing a pilot test plan at IHSS 110.

2. There are several inconsistencies between the IM/IRAP, the SVS work plan, and the pilot test plan. For example, the IM/IRAP states that during the SVE test high energy particulate (HEPA) filters will be followed by a radiation sensor. This sensor would shut the system down before releases of major amounts of radionuclides to the granular activated carbon (GAC) unit could occur. This sensor system, however, is not shown in the SVE pilot test plan (see Appendix A Diagram Number 11). Similarly, the IM/IRAP states, on page 4-33, paragraph 2, that a hydrocarbon concentration of 1 part per million (ppm) will be used for determining a proposed test site. The SVS work plan, however, lists the criterion as a cumulative concentration of all analytes equaling or exceeding 10 part per million volume (ppmv). These inconsistencies should either be eliminated or explained.

3. The IM/IRAP states that the phase II data will be used in the pilot test plans to refine the existing conceptual models of the test areas. This was done for the East Trenches test plan, but the data should be carefully checked for both the 903 Pad and Mound Area pilot test plans.

3.0 SPECIFIC COMMENTS

The following specific comments address the technical inadequacies and inconsistencies noted in the SVS work plan and SVE pilot test plan.

3.1 SOIL VAPOR SURVEY WORK PLAN

1. Page 1, Section 2.1. This paragraph references 5,000 gallons of fluid released at the former drum storage area. It is not clear how this volume estimate was determined as the June 1992 historical release report does not list a specific volume of fluid spilled in this area. The appropriate reference should be added to this paragraph.

   Rationale: Data listed in this section must be properly substantiated.

2. Page 3-15, Section 3.5.2. Reference is made in this section to a slam bar that will be used to drive a preliminary hole in the soil in areas where hole refusal is possible. The slam bar is described as having a diameter less than the soil probe. Further details of how this slam bar will be handled in the field must be provided. In addition, the diameters of the soil probe and slam bar should be listed. This is important, since a very thin slam bar may be inappropriate for the cobbly surface soils at Rocky Flats.

   Rationale: As currently written, this section of the work plan does not provide sufficient detail to direct the field program.

3. Page 2-2, Section 2.2. The log of boring 7391 is not provided for review. The information from the phase II boring should either be provided in the SVS work plan or the pilot test plan for the 903 Pad Area.

   Rationale: Subsurface geology data not previously presented which provide the base for study design should be provided for review.

4. Page 3-2, Figure 3-1. This figure currently lists the 903 Pad in the boxes located under the title block Phase III Work for the East Trenches Area. This typographic error should be corrected.

   Rationale: All work for the East Trenches Area should be correctly labeled East Trenches Area.

5. Page 3-3, Section 3.3. This section and the accompanying figures state that the SVS samples will be collected at 30-foot intervals. However, Appendix A states that the sampling points are based on a 15-foot grid spacing. This inconsistency should be corrected.

Rationale: For clarity among field workers, the text and appendices should specify the same sampling grid.

6. Figures 3-3, 3-5, and 3-6. These three figures illustrate the sampling locations for IHSS 109, IHSS 110, and IHSS 111.1. IHSS 111.1 and 109 are the designated alternate test sites for the East Trenches Area and 903 Pad respectively. All three of these IHSSs are rectangular in shape and are approximately 3-feet wide. Even though these IHSSs are very narrow, SVS samples will be collected on both sides of the trenches. Because a SVS sampling grid is normally between 25- and 50-feet wide, it is not clear why SVS sampling points are needed across a distance of only 3 feet. Justification for this spacing should be provided prior to initiating this field program.

Rationale: SVS sample locations on one side of the IHSS rectangle should be able to detect any accumulation of soil vapor in a 3-foot area.

3.2 PILOT TEST PLAN

Comment 1. Page 2-2, Section 2.1.3.1, Paragraph 1. The conceptual model for IHSS 111.1 was based on logs from boreholes number 10291, B217589, and others. The other logs used to define the conceptual model should also be listed in the paragraph.

Rationale: All supporting data should be clearly referenced in the text.

Comment 2. Page 2-4, Figure 2-2. The new conceptual model of the East Trenches does not illustrate the interbedded interval between 34 and 60 feet. The conceptual model should be modified accordingly.

Rationale: The conceptual model should accurately reflect known subsurface geology features.

Comment 3. Page 2-5, Section 2.1.4.1. The listed depth-to-water of 35 feet is not confirmed in the log of borehole 10291. If water was encountered during the drilling of this well, it should be indicated on the log.

Rationale: If the borehole log does not confirm the statement in the text, the reference should be removed.

Comment 4. Page 2-6, Section 2.1.4.2, Paragraph 1. The first statement indicates that a trichloroethene (TCE) concentration of 221.9 milligrams per liter (mg/l) in ground-water samples (which represents 20 percent of the TCE solubility limit) suggests the presence of residual, free-phase TCE in the soils or bedrock underlying IHSS 111.1. This statement requires elaboration as there is no evidence to substantiate this conclusion. In addition, this paragraph attempts to characterize the entire IHSS 111.1 based on ground-water samples collected from monitoring well 3687, which is about 325 feet (ft) northeast of the study area (west end of IHSS 111.1). While useful as a reference, these data are insufficient to characterize the study area.

Rationale: Site-specific data should be used as much as possible to minimize potential problems during implementation of the pilot test.

Comment 5. Page 2-9, Section 2.2, Paragraph 3. The first statement specifies that previous studies indicate that the suspected residual contamination underlying IHSS 111.1 is amenable to treatment by SVE. It is unclear what previous studies are referred to. It should be specified whether these studies were literature surveys or other small-scale studies.

Rationale: The type of available data can have significant impact on the design of the pilot plan. Further, the nature of contaminants and treatment potential by SVE are critical to the success of the program.

Comment 6. Page 3-1, Section 3.1, Paragraph 1. This paragraph is the first introduction of the western end of IHSS 111.1 as the study area. The selection of one end of the IHSS as the study area and the rationale provided for limiting the study to a small area of the IHSS should be described earlier in the report.

Rationale: The study area should be identified earlier in the report and a rationale for selecting the study area should be provided.

Comment 7. Page 3-3, Section 3.2.2, Paragraph 4. This paragraph discusses the technical difficulties of the design and implementation of the SVE system in the IHSS 111.1 area. These problems include lack of sufficient data on volatile organic compound (VOC) contamination, the possible heterogeneity of the area that may contain a loosely packed backfill soil, and the presence of undisturbed soil. The plan needs to elaborate the reason for selecting this area despite these technical problems.

Rationale: Site selection requires adequate data collection in order to match the technology with the study area and its contaminants.

Comment 8. Page 4-15, Section 4.8.2, Paragraph 2. This paragraph states that only samples collected during the drilling for vapor extraction vents will be candidates for laboratory analysis. It also states that if no organic vapor readings are measured in any soil samples collected during drilling for vapor extraction vents, the sample collected nearest to the water table in each boring will be forwarded to the laboratory. A rationale should be provided for these statements.

Rationale: The sampling and analytical protocols should be clearly specified in this pilot test plan. Confirmatory samples may be taken to determine the effectiveness of the SVE technology.

Comment 9. Page 5-4, Section 5.3, Paragraph 1. The daily maximum ground water that will accumulate in the storage tank is given as 7,200 gallons. This value does not take into account water that will be generated from passing the soil vapor through the knockout drum and demister. This source should be added to the total flow.

Rationale: To determine the required total daily storage capacity of the tank, all flow rates should be included.

Comment 10. Page 6-1, Section 6.1, Paragraph 2. This paragraph states that the mobile vapor extraction pilot unit was not sized specifically for the SVE test at IHSS 111.1. Instead, it states the pilot was sized to accommodate expected conditions at other proposed SVE test sites at the site. It is unclear whether this refers to IHSS 110 or other sites at Rocky Flats. This statement appears to be implying that the SVE test will not be conducted at IHSS 111.1, as specified in the pilot test plan. If this is the case, it should be discussed in the beginning in the pilot test plan.

Rationale: The pilot test plan should be specific in discussing the potential test site, or it should state that the final selection is deferred until the SVS is completed.

Comment 11. Page 6-15, Section 6.8.1, Paragraph 1. The first sentence regarding the radiation monitoring system refers to Drawing Number 10. This should be corrected to say Drawing Number 11. Drawing Number 10 is the legend for process and instrumentation diagram (P&ID) symbols.

Rationale: Drawing numbers should be referred to correctly to avoid confusion.

Comment 12. Appendix E, Design Calculations. Most of the design calculations are not sufficient. For example, for blower-sizing calculations, the test plan shows three configurations. The third configuration, which consists of three blowers and no heat exchanger, was selected without any calculations. Only advantages and disadvantages of each configuration were provided. In addition, calculations for the proposed ground water

extraction rate of 5 gallons per minute (gpm) have not been provided. All design calculations should be shown with the related assumptions and references.

Rationale: Design calculations provide the rationale for selecting specific methods, equipment, and system operations, and therefore should be complete.